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Abstract

A 3-year study attempted (1) to predict reading achievement through third grade, (2) to establish data for a nonverbal discrimination test, (3) to devise supplementary perceptual instructional programs, and (4) to develop screening devices to assess perceptual abilities and identify potential learning disabilities. In first, second, and third grades 140 Negro and white children of lower and middle class backgrounds were administered a battery of auditory and visual perceptual tests. The children had the same reading program and took a reading achievement test in first grade and at the end of third grade. Correlations between tests of nonverbal auditory and visual perception and reading achievement remained significantly high and rather constant over the 3-year period. The best predictor of reading ability was the Test of Non-Verbal Auditory Discrimination, but all perceptual tests were more effective than IQ measures. By using group-administered, nonverbal auditory and visual perception tests, it is possible to identify children's potential in reading achievement at the beginning of first grade, and to develop special instructional methods for children with perceptual problems. (MH)

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Group Screening of Auditory and Visual Perceptual Abilities: An Approach to Perceptual Aspects of Beginning Reading*

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Background

The material included in this report represents some of the major findings of a three-year longitudinal study of auditory and visual perception. One of the immediate objectives was that of predicting reading achievement through the third grade. The secondary long-term objective is that of establishing normative data for a non-verbal auditory discrimination test. Third, is to work toward supplementary perceptual instructional programs for children in the primary grades based on their auditory and visual perceptual strengths and weaknesses. The fourth and long-term objective, which perhaps is the most important underlying purpose, is that of developing group screening devices in the area of auditory and visual perception to be used for assessing perceptual abilities and identifying potential learning disabilities

Perhaps we should ask whether it is necessary to consider screening and group procedures. Response to the inquiry might lead us to abandon some aspects of clinical functions and the diadic model, especially as a psychologist works in the school and community. Historical and research evidence suggest that the clinical-diadic model does not meet our needs (Redlich; Srole; Leighton). This is not to minimize the importance of the rigors of individual psychological assessment, treatment or remediation, but rather to extend research and clinical practice to a broader orientation.

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In order to maintain pace with psychological and educational problems, we will have to turn to early assessment to identify target or high risk children on whom to focus so as to prevent more serious problems from developing. Thus, we will have to determine the incidence prevalence, and work toward prevention of learning and adaptation problems in the school. In so doing, we will begin to implement the notion epidemiology. It is possible in a school setting to work toward primary prevention, which implies a focus on the factors which lead to disorders rather than on focusing on individuals after the fact. We thus would identify targets on which to direct our energies (Caplan). Prevention also involves intervention that promotes mental and/or emotional adaptation, or reduces incidence and prevalence of learning and behavior disorders in the <u>population-at-large</u> (Bower).

Theoretical basis for the study dates back to Charcot (Freud, 1953) who said that children have specialized propensities for learning in either audile, visile or tactile modes. This concept - the modality concept - has parallel and independent origin in the writings of Galton and Binet. In about 1883, Galton suggested that individuals have separate auditory and visual imagery systems, and indicated that persons possessing vivid visual imagery tended to focus on the visual equivalent and not on the spoken equivalent of words. He thus implies individual differences in the ability to learn either visually or auditorally. Binet (1912) considered perception as it related to abstract thought, and he also spoke of perceptual imagery systems. He made references to Charcot, and perhaps, was the first to offer some supportive evidence. Whereas Charcot divided

people according to three perceptual categories, Binet suggested that there was a fourth "indifferent" type of "imager" which apparently was a person who had comparable and relative strengths in each perceptual modality.

More recently, Wepman, (1964), Harris (1964) and Buktenica (1966, 1968) have discussed the need to consider individual propensities in the perceptual modalities, and that we should be obliged to consider instructional methods adpated to each child's particular strengths or weaknesses in auditory, visual or tactile perception.

With that brief background of the modality concept and some notion of epidemiology, we embarked on the longitudinal study in the area of perception and early learning.

Design

A sample of 140 some children were followed over a three-year period. The sample represents children from middle-class white, lower-class white, and lower-class Negro backgrounds. All children included in the sample were within the average intelligence range and all were exposed to the same reading program. During their first year of school, they were administered a battery of auditory perceptual, visual perceptual, intelligence, reading and spelling achievement tests.- all group administered. In the second year of school they were administered the auditory and visual perceptual tests. In the third year the children were administered the auditory and visual perceptual tests, as well as the reading achievement tests at the end of the 3rd grade. The tests and their reliability are noted in Table 1, and are described in another context (Buktenica, 1966). All of the tests were administered in classroom sized groups within the confines of a classroom.

The study was designed to test the following hypotheses:

1. Reading achievement can be predicted through third grade with performance on group administered, non-verbal auditory and visual perceptual tests administered in the first grade at a level of statistical significance.

2. Correlation coefficients between non-verbal auditory visual perceptual variables and reading achievement will tend to decrease from first through third grade.

Results

The relative contribution made by each of the independent variables (auditory perception, visual perception, and IQ) in predicting the dependent variables (reading achievement) was determined with step-wise multiple regression analysis. Reliability of the tests was also determined as indicated in Table 1.

The highest correlation between predictors and achievement variables was obtained with the Test of Non-Verbal Auditory Discrimination (TENVAD), statistically significant at the .01 level or beyond (Table 2). The correlation values in the parentheses in rows 5, 6, & 7, represent the correlation between first year predictors and reading at the end of first grade. Comparisons can then be made with the relationship between the first year predictor and achievement at the end of third grade. The subscripts, 1, 2, 3, noted for the other variables refer to the year those tests were given. It should also be noted that the correlations between TENVAD and the achievement variables maintain at the same level when administered in first, second and third grades. A similar phenomenon occurs with the VMI and the Wepman Auditory Discrimination Test. The second hypothesis is then disconformed in that the correlation between perceptual variables and reading did not tend to decrease from first through

third grade. In fact, there is a tendency for the Wepman, which is verbal in nature, to increase in its relationship with achievement from first through the third grade.

Some two dozen cases of step-wise multiple regression consistently determined TENVAD to be the best predictor of first and third grade achievement, when all varialbes are considered in many combinations. Futhermore, Table 3 will indicate that the percentage of variance explained by TENVAD as well as the VMI, and the combination of the two, are significant at less than the .001 level. These data, then, support the hypothesis that reading achievement can be predicted through third grade at a statistically significant level with performance on group administered, non-verbal auditory and visual perceptual tests administered in the first grade.

It will also be noted in Table 4 that the multiple correlation between TENVAD and the VMI with reading levels at first grade level range from .58 to .61. Similarly, the multiple correlation between the first grade variables and third grade achievement range from .51 to .54. A similar pattern is noted within the variables considered separately: and once again, all the values are significant at less than a .001 level.

Conclusions

Results of the study indicate that correlations between tests of non-verbal auditory and visual perception remain rather constant with the verbal acheivement measures over a three year period from first through third grade. Thus, an underlying relationship between non-verbal variables and the verbal learning of reading is suggested and perhaps the perceptual factors are requisites for learning ro read. Again note that the relationship

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between the Wepman Auditory Discrimination Test and reading achievement tends to increase through the third grade level indicating that the more verbal-type tasks tend to be more closely related to verbal learning as a child approaches eight or nine years of age. That relationship (proposed by others, e.g., Frostig and Wepman) is based on the premise that higher level thought processes begin to dominate cognitive functions of children at about eight years of age, with non-verbal perceptual processes becoming less important at that age level and beyond. We cannot overlook the finding however, that TENVAD maintains its rather high level of correlation with the achievement variables than does the IQ measure.

The data strongly suggest that we are able to identify children's potentiality in reading achievement at the beginning of first grade with group administered, non-verbal auditory and visual perceptual tests. It should then be possible to identify target children, and establish appropriate intervention in order to maximize early learning.

The two non-verbal perceptual tests account for more variance in reading than does the group administered intelligence test, (which takes about four times as long to administer) and seem to provide a better description and identification of children's functional abilities than does the group administered intelligence test. Not only are the tests easily administered but they can be easily scored and interpreted by a classroom teacher with a limited amount of orientation and training.

It seems then that the group administered Test of Non-Verbal Auditory Discrimination and Visual-Motor Integration Test will facilitate assessment of strengths and weaknesses in the perceptual domain, the prevalence of

perceptual difficulty, and contribute to instructional programs that will lead toward prevention of learning disabilities in the primary grades. Results should enable us to begin to explore optimal instructional methods for children in the primary grades based on auditory and visual perceptual propensities in order to maximize academic development.

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TABLE 1

Classification and Reliability of Variables

Variable	Reliability*
Science Research Associates, Primary Mental Abilities Test (I.Q.)	.93
Beery-Buktenica Visual-Motor Integration Test (VMI)	.78
Wepman Auditory Discrimination Test (WADT)	.72
Non-Verbal Auditory Discrimination Test (Buktenica) (TENVAD)	.78
Reading Total (MAT Total)	.96
Word Knowledge	.93
Word Discrimination	.92
(Metropolitan Achievement Tests)	.93

*Based on Kuder-Richardson Formula 20

TABLE 2

Correlation Matrix for Variables

Administered 1st Through 3rd Grade

		IQ 1	VMI 2	WADT 3	NVADT 4	MAT Total 5	Word Know. 6	Word Discr. 7
IQ	1	1.0						
VMI[1]	2	.43	1.0					
VMI[2]								
VMI[3]								
WADT[1]	3	.40	.26	1.0				
WADT[2]			.22					
WADT[3]			.27					
NVADT[1]	4	.45	.37	.50	1.0			
NVADT[2]			.40	.42				
NVADT[3]			.35	.35				
MAT Total[1]	5	(.47)	(.50)	(.46)	(.51)	1.0		
MAT Total[3]		.43	.40	.43	.52			
MAT Total[3]			.37	.40	.51			
MAT Total[3]			.40	.49	.48			
Word Know.[1]	6	(.46)	(.49)	(.45)	(.47)	(.97)	1.0	
Word Know.[3]		.41	.38	.44	.53	.97		
Word Know.[3]			.34	.39	.45	.97		
Word Know.[3]			.37	.47	.45	.97		
Word Discr.[1]	7	(.45)	(.48)	(.44)	(.51)	(.97)	(.88)	1.0
Word Discr.[3]		.43	.41	.38	.48	.96	.88	
Word Discr.[3]			.39	.39	.53	.96	.88	
Word Discr.[3]			.41	.48	.49	.96	.88	

TABLE 3

Per Cent of Variance Explained* by 1st Year

Predictors of 1st & 3rd Year Reading

Variables	MAT Total		Word Know.		Word Discr.	
	1st Yr.	3rd Yr.	1st Yr.	3rd Yr.	1st Yr.	3rd Yr.
$TENVAD_1$ VMI_1	37	32	34	31	35	29
$TENVAD_1$	26	27	22	28	34	31
VMI_1	25	—	24	23	23	—

*All values significant at .001 level.

TABLE 4

Multiple Correlations* Between 1st Year

Predictors and 1st & 3rd Year Reading

Variables	MAT Total		Word Know.		Word Discr.	
	1st Yr.	3rd Yr.	1st Yr.	3rd Yr.	1st Yr.	3rd Yr.
$TENVAD_1$ VMI_1	.61	.51	.58	.55	.59	.54
$TENVAD_1$	.51	.52	.49	.53	.51	.48
VMI_1	.54	—	.51	.48	.48	—

*All values significant at .001 level.